

## CERTIFICATE OF VERIFICATION

I, Ji Hyun Lee of Patrea Co.,Ltd., 4<sup>th</sup> floor Hyundai Building, 175-9 Jamsil-dong, Songpa-gu, Seoul 138-861 Republic of Korea state that the attached document is a true and complete translation to the best of my knowledge of the Korean-English language and that the writings contained in the following pages are correct English translation of the specification and claims of the Korean Patent Application No. **10-2002-0072519**.

Dated this 4th day of May, 2010

Signature of translator: ORIBY

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# **KOREAN INTELLECTUAL PROPERTY OFFICE**

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Application Number: 10-2002-0072519

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Applicant(s): LG Electronics Inc.

**COMMISSIONER**

**[ABSTRACT OF DISCLOSURE]****[ABSRTACT]**

The present invention relates to a method of managing a still image of high density optical disk such as a rewritable Blu-ray disc (BD-ROM), which is useful to variously reproduce and output video and video still images or audio and audio still images using navigation information in an optical disk apparatus, whereby a plurality of still images and navigation information, that are recorded on a high density optical disk such as a rewritable Blu-ray disk (BD-RW) and a Blu-ray disk read only (BD-ROM), are managed based on a file structure and cording format of the rewritable Blu-ray disc (BD-RW) in order to optically control still images.

**[REPRESENTATIVE DRAWING/ TYPICAL DRAWINGS]**

FIG. 8

**[INDEX WORDS]**

rewritable Blu-ray disk (BD-RW), Blu-ray disk read only (BD-ROM), still image, file structure, still information file

**[SPECIFICATION]****[TITLE OF THE INVENTION]**

METHOD FOR MANAGING A STILL IMAGE OF HIGH DENSITY OPTICAL DISC

**[BRIEF DESCRIPTION OF THE DRAWINGS]**

FIG. 1 illustrates a method of controlling still images of a video object unit (VOBU) in a DVD-video.

FIG. 2 illustrates a method of controlling still images of a Cell in a DVD-video.

FIG. 3 illustrates a method of controlling still images of a video object (VOB) in a DVD-VR.

FIGS. 4 to 6 illustrate a method of controlling still images of an audio still video unit (ASVU) in a DEV-audio.

FIG. 7 illustrates a method of controlling still images of an audio still video unit (ASVU) in a DVD-AR.

FIG. 8 illustrates a still clip file and a still clip information file, which are associated each other according to a method of managing still images of a high density optical disc in the present invention.

FIGS. 9 to 11 illustrate a method of managing still images of a high density optical disc according to exemplary embodiments of the present invention.

FIG. 10 illustrates a schematic diagram of an optical disk apparatus of the present invention.

FIGs. 12 and 13 illustrate a method of reproducing still images of a high density optical disk according to exemplary embodiments of the present invention.

**\*Description of main part in drawings\***

10: optical disk  
11: optical pick-up  
12: VDP system  
13: D/A converter

**[DETAILED DESCRIPTION OF THE INVENTION]**

**[OBJECT OF THE INVENTION]**

**[FIELD OF THE INVENTION AND BACKGROUND OF THE RELATED ART]**

The present invention relates to a method of managing still images of a high density optical disk such as a rewritable Blu-ray disk (BD-RW) and a Blue-ray disk read only (BD-ROM).

In general, optical disks capable of recording large amounts of high-quality video and audio data have been progressing rapidly and been commercially available. For instance, digital versatile disks (DVD) such as DVD-video, DVD-VR, DVD-audio, and DVD-AR are examples of these optical disks.

An optical disk apparatus for reading and reproducing data recorded on the DVD performs still operation using

navigation information being managed and recorded on the DVD. In the still operation, playing still pictures is limitless or limited. Such operation will be explained in more detail as follows.

FIG. 1 illustrates a method of controlling still images of a video object unit (VOBU) in a DVD-video. In the above method, a sequence end code (Sequence\_End\_Code) is recorded on an ending portion of video data included in a video object unit. And then, a decoder detects the sequence end code for a still operation so that the video remains on still mode.

Meanwhile, a PCI packet (Presentation Control Information) of a navigation pack (NV\_PCK) is recorded on a beginning portion of the video object unit. The PCI packet includes start time information (VOBU\_S\_PTM) and end time information (VOBU\_E\_PTM) for a reproduction of the video object unit, also includes end time information (VOBU\_SE\_E\_PTM) for still operation.

In case that the video ending time information is detected, the optical disk apparatus appropriately outputs a normal video data recorded on the ending portion of related video object unit. In this case, the state of limitless still is continued in the video.

FIG. 2 illustrates a method of controlling still images of Cell in a DVE-video. As shown, a final picture

data of the last video object unit (VOBU) included in a cell is played based on cell still time information defined by cell playback information (C\_PBI: Cell Playback Information). During such time, the state of video still is continued such that the video outputs the picture data as still images.

In this case, the optical disk apparatus may have the state of the video still be limited or limitless whereby the final picture data may include the sequence end code (Sequence\_End\_Code) for still operation, or not.

Meanwhile, the coding type of the still image in the DVD-Video is not totally related to I-picture, P-picture and B-picture. This coding type is controlled by a MPEG decoder and mycom included in the optical disk apparatus, and the still operation may be used for a menu background or a slide show.

FIG. 3 illustrates a method of controlling still images of VOB in a DVD-VR. In the above method, one still picture including the sequence end code, and an audio data related to above-mentioned still picture are defined as the video object unit (VOB). The still picture is encoded in manner of MPEG and recorded/managed as a separate file (VR\_STILL.VRO, VR\_MOVIE.VRO) on specific area, which occurs totally irrelevant to a movie data.

Meanwhile, a plurality of video object units are defined as VOG (Group Of VOBs), and each VOG have VOB entries and A/V attribute information to manage records of the still images. The records of the still images may be stored as a cell within program or user defined program chine (UD\_PGC) so that the video data and the still picture are played simultaneously, as a result, the optical disk apparatus can reproduce still pictures and video together.

FIG. 4 illustrates a method of controlling still images of an audio still video unit (ASVU) in a DVD-audio. In the above method, the DVD-audio plays a slide show by ASVU unit including a plurality of audio still video (ASV). One audio still video comprises a COP including a sequence header, a GOP header, a I-picture, and a sequence end code.

Meanwhile, the audio still video (ASV) is recorded on a separate area differently from that of video data. One ASVU includes the plurality of ASV having the same attribute to the ASVU, which is controlled as the ASVU unit. In this case, navigation information, for example, program number, a display timing, an effect mode, and the like are recorded as the ASV unit, and navigation information, for example, a video attribute, a display mode (e.q., Silde Show, Browsable), a display sequence (e.q., Sequential, Random/Shuffle), display time, and the like, are recorded as the ASVU unit.



Accordingly, the optical disk apparatus records the read data of the ASVU unit on memory, and then performs the slide show as shown in FIG. 4, or performs a random/shuffle slide show as shown in FIG.5, according to the display sequence and display timing of each ASV.

Also, as shown in FIG. 6, the browsable show may be played. For instance, in case that 'Next' key is input during displaying a first ASV, a third ASV is automatically displayed after a second ASV is displayed. And, in case that 'Previous' key is input during displaying the third ASV, the browsable show displaying the previous second ASV is performed. In doing so, the other ASV can be displayed only when a user input the relevant key.

FIG. 7 illustrates a method of controlling still images of an audio still video unit (ASVU) in a DVD-AR. In the above method, the slide show is played as ASVU unit including a plurality of audio still video (ASV), and a still image format including the JPEG still picture and the sequence end code.

Meanwhile, each program corresponds to the ASVU. The navigation information, for instance, a display mode, display effects, and duration, are recorded as the program unit, and address information, for instance, a video attribute, recording time, and ASV start address information, are recorded as the ASVU unit.

Accordingly, the optical disk apparatus performs the function similar to the browsable show in the DVD-audio. The method of reproducing the ASVU which is identical to that of DVD-audio is to record all of the ASVU on the memory for displaying them. In this case, still pictures are output and displayed as 'Album' and 'Song' picture type in common.

In recent years, the high density optical disk having a higher recording density than DVD, for example, the rewritable Blu-ray disc (BD-RW) has been rapidly advanced. Also, the Blu-ray disc (BD-ROM) based on recording format of the BD-RW has been under discussion about standardization thereof between companies in the related filed. Yet, the beneficial method of managing the still images and file structure optical to the high density optical disc as above-described has been not arranged.

#### **[TECHNICAL SOLUTION OF THE INVNETION]**

In order to solve above-descried one or more problems due to limitations and disadvantages of the related art, an object of the present invention is to provide a method of managing still images of a high density optical disk, which records and manages a plurality of still images and navigation information recorded on a high density optical disc such as a rewritable Blu-ray disk (BD-RW) and a Blu-

ray disk read only (BD-ROM), based on a file structure and cording format of the rewritable Blu-ray disc (BD-RW) in order to optically control still images.

**[SYSTEM AND OPERATION OF THE INVENTION]**

Reference will now be made in detail to the preferred embodiment of the present invention, examples of which are illustrated in the accompanying drawings.

A method of managing still images for a high density optical disc in accordance with an exemplary embodiment on the present invention records a plurality of still image pictures like a plurality of JPEG still image pictures on a Blu-ray disk read only, based in part on the file structure and recording format of the BD-RE. As shown in FIG. 8, the plurality of still image pictures are stored as a separate clip file (Still Clip File), and the plurality of JPEG still image recorded continuously are stored on one separate still clip file.

After the still clip file is stored, a still clip information file (Still Clip information File) corresponding the still clip file is created and recorded. The still clip information file includes an entry point map (EP\_Map) a plurality of still sequence (Still\_Sequence).

Each of the entry points contained in the entry point map is associated with a still image picture.

An entry point for a still image picture may include address information and duration information for the still image picture. In stead of or addition to the duration information, the entry point may include a presentation time stamp (PTS) for the associated still image picture. The entry point may further include duration information or a presentation time stamp (PTS) of audio data to be played simultaneously with the still image picture.

As shown in FIG. 8, each of the still sequences included in the clip information file has the information fields of start picture number (Start\_picture\_number), the number of picture (Number\_of\_picture), and picture size (Picture\_size). The name of each field is self explanatory as to the information being conveyed in that field. Each of the still image pictures associated with a sequence have the same attribute and picture size.

As shown, the first still sequence (Still\_sequence 1) has the information that Start-picture\_number=1, Number\_of\_picture=7, and Picture\_size=1920\*1080; and the second still sequence (Still\_sequence 2) has the information that Start-picture\_number=8, Numver\_of\_picture=10, and Picture\_size=960\*540. Furthermore,

the start of the still sequence (Start of Still\_sequence) may be represented by an offset picture number.

Meanwhile, a play item (PlayItem) and a sub-play item (subPlayItem) are stored in a playlist (PlayList) file as navigation information for reading and reproducing audio data associated with the still image pictures. The play items of a playlist are used to manage reproduction of video data forming still image pictures and the sub play items of the playlist are used to manage reproduction of video data for playback with the still image pictures. A play item may indicate reproduction of a group of still image pictures, and also may indicate display mode for the group.

For instance, FIG. 9 illustrates an exemplary embodiment of managing reproduction of still image pictures and audio data using play items and sub-play items in association with the embodiment of FIG. 8. As shown, the play item of a playlist includes the information 'IN\_Picture' and 'OUT\_Picture', which indicates the beginning and ending of a group of still pictures. Also, the sub-play item of the playlist includes the information 'IN\_Time' and 'OUT\_Time', which indicates the beginning and ending of an audio stream in a clip file separate from the still clip file to be played in association with the still image pictures.

Accordingly, an optical apparatus as shown in FIG. 10, may read and reproduce sequentially the plurality of still image pictures stored in the still clip file, which include an optical pick-up 11, a VDP (Video Disc Play) system 12, and a D/A converter 13. To perform above serial process, the entry points and still sequence contained in the still clip information (Still Clip information) files are used.

Furthermore, the 'IN\_Time' and 'OUT\_Time' information provided by the sub-play item is synchronized with the 'IN\_Picture' and 'OUT\_Picture' provided by the playa item such that during reproduction, an optical disk reproducing apparatus play backs the audio data for the still image pictures in synchronization with the display of those pictures.

Meanwhile, as shown in FIG. 11, when the display duration of theses still image pictures set to limitless, the optical disk apparatus plays the audio data associated with the still image picture repeatedly without limit while playing the still image pictures repeatedly, or alternatively for a prescribed number of repetitions. Also, in response to the limitless duration of the still image picture, the optical disk apparatus displays the still image pictures until user input is received.

For instance, the optical disk apparatus as shown in FIG. 12, performs a slide show, which sequentially displays

a plurality of still image pictures stored in a clip file according to the duration information included in the entry points of the clip information file associated with the clip file.

Alternatively, a presentation time stamp for each of the still images may be recorded instead of the duration information. In this case, the optical disk apparatus performs the slide show in the same manner using the audio duration information or audio presentation time stamp.

If the above entry point includes audio duration information or audio presentation time stamps related to the still image pictures, the optical disk apparatus performs a slide show in the same manner using the audio duration information or audio presentation time stamps.

And, the optical disk apparatus may also perform a browsable slide show in which a plurality of still image pictures are displayed with unlimited duration. In a browsable slide show, the optical disk apparatus skips between playing still images based on user input.

For instance, as shown in FIG. 13, the optical disk apparatus explores and plays a third image picture based on the entry point included in the still clip information file if a user requests exploring and playing the third still image picture prior to complete reproduction of a second image still picture.

Moreover, if during the display of the third still image picture a user requests exploring and playing the second still image picture that was previously reproduced, the optical apparatus performs a slide show to display the second still image picture in the same manner using the audio duration information or audio presentation time stamps.

While the invention has been disclosed with respect to a limited number of embodiments, those skilled in the art, having the benefit of this disclosure, will appreciate numerous modifications and variations there from. For example, while described with respect to a rewritable Blu-ray disc (BD-RW) as well as a Blu-ray disc read only (BD-ROM) in several instances, the present invention is not limited to this standard of optical disk or to optical disks. It is intended that all such modifications and variations fall within the spirit and scope of the invention.

#### **[EFFECT OF THE INVENTION]**

A method of managing a still image of a high density optical disk according to the present invention that has above-described configuration is useful to reproduce and output video data and video still images or audio data and audio still images for various display type using



navigation information in an optical disk apparatus, whereby a plurality of still images and navigation information, that are recorded on a high density optical disk such as a rewritable Blu-ray disk (BD-RW) and a Blu-ray disk read only (BD-ROM), are managed based on the file structure and recording format of the rewritable Blu-ray disc (BD-RW) in order to control optically still images.

**What is claimed is:**

1. A method of managing a still image of a high density optical disk, comprising:

storing a plurality of JPEG still image pictures that are recorded on a data area of high density optical disc as a separate clip file separately from that of video data or audio data; and,

storing navigation information as a still clip information file corresponding to the still clip file, in order to read and reproduce the still image pictures.

2. The method of claim 1, wherein an entry point corresponding to the still image pictures includes address information and reproduction control information, and a plurality of the entry points are stored as an entry point map contained in the still clip information file.

3. The method of claim 2, wherein a duration information indicates that one still image picture has an unlimited display duration or a prescribed number of repetitions, and the reproduction control information includes the duration information or a presentation time stamp .

4. The method of claim 2, wherein the reproduction control information include audio duration information associated with one still image picture, or includes an audio presentation time stamp.

5. The method of claim 1, wherein the information field of start picture number, the number of pictures, and a picture size for the associated still image pictures are stored as a still sequence contained in the still clip information file, and each of the still image pictures associated with the sequence have the same attribute and display mode.

6. The method of claim 1, wherein display mode information, start picture number, and end picture number for the plurality of still image pictures included in the still clip file are stored on a play item of a playlist file corresponding to the still clip file.

7. The method of claim 6, wherein navigation information for reading and reproducing audio data which is played simultaneously with the plurality of still image picture are stored on a sub-play item of the playlist.

8. A method of managing a still image of a high density optical disk, comprising:

reading and reproducing a plurality of still image pictures stored as a separate still clip file of a high density optical disk, using a still sequence and entry point of a still clip information file corresponding to the still clip file; and

reproducing and outputting audio data associated with the still image pictures, simultaneously with the still image pictures, using navigation information of a playlist file associated with the still clip information file.

9. The method of claim 8, wherein the still image pictures are sequentially reproduced according to display mode information included in a play item of the playlist file, or variously reproduced according to user's input.

10. The method of claim 8, wherein audio data associated with the still image pictures are sequentially

reproduced according to navigation information included a sub-play item of the playlist, or variously reproduced according to user's input.